July 2003/**30**

Good practice

Value for money study

This report is for information and guidance

This report, commissioned by the UK Value for Money Steering Group, provides an update of the energy management VfM study completed in 1996 ('Energy management study in the higher education sector: National Report', HEFCE M5/96). It identifies key actions and future issues that need to be addressed by HE institutions in developing a strategic policy framework for sustainability that includes energy management.

The UK Value for Money Steering Group

Energy management in higher education

Value for money study

HIGHER EDUCATION FUNDING COUNCIL FOR ENGLAND

Management of energy in higher education

Table of contents

Summary

This value for money (VfM) project provides an update of the energy management VfM study completed in 1996 ('Energy management study in the higher education sector: National Report', HEFCE report M 5/96). Firstly, it provides an overview of the management arrangements for utilities in the HE sector. Secondly, it identifies those key actions and future issues that need to be addressed by HE institutions in developing a strategic policy framework for sustainability that includes energy management.

In 1996, the achievements already made by a number of higher education institutions (HEIs) in the efficient use of energy were readily acknowledged. Some institutions have been actively committed to energy management for a number of years prior to the start of the 1996 study, as shown by their ongoing investment of resources in energy management. For other institutions, the study highlighted that there were real opportunities to be gained from the implementation of a range of energy saving measures. The study stressed that if the management of energy was not seriously considered by these institutions there was a risk that it would be, and continue to be, largely a technical issue rather than a management concern.

Since the 1996 study, further study surveys have been undertaken on energy management in the higher education (HE) sector. Overall, findings support the view that while further progress has taken place within the HE sector, opportunities to implement best practice for energy management issues have not always been taken. Much of the advice provided in the 1996 study is still valid, providing help to institutions in overcoming barriers to progress in energy conservation. The guidance provided in this web-based documentation will be of interest to three groups in particular:

- higher education institutions – members of senior management team and energy management staff
- HE sector bodies – such as the Association of University Directors of Estates (AUDE), the Association of University Engineers (AUE) and the British Universities Finance Directors Group (BUFDG)
- HE funding councils.

HE institutions

The suggested actions in this guidance ought to be actively adopted by all institutions, to deliver value for money. Specifically, institutions now need to consider the following areas:

- developing a strategic policy framework for sustainability, to include energy management issues
- responding proactively, by taking actions in anticipation of impending European directives and UK legislation (investing in best management practice)
- undertaking further investment in energy conservation, taking account of risk management and whole-life costing within business case proposals for capital and maintenance projects
- enhancing management information to inform decision-making – by highlighting the cost-savings benefits that have already been achieved, and the further opportunities available if those savings were re-invested in other energy conservation measures
- adopting a team approach to managing 'energy' that would includes all utilities
- improving the staff development arrangements and the communication channels within institutions, to aid a better understanding of sustainability issues for energy and the environment.

It is suggested that institutions use the checklists 1 and 2 in Appendix D2, to assess the effectiveness of their energy management arrangements. Realistic targets should then be identified to monitor performance over the next three to five years in respect of the following objectives:

- complying with legislation
- aligning with good management practice
- achieving value for money.

HE sector bodies

A number of sector-based initiatives have taken place since 1996. The contribution made by these initiatives is important in terms of knowledge, purchasing energy, performance statistics and good practice.

ShareFair Higher Education Energy Management Network

The ShareFair Higher Education Energy Management Network was established in 1997 to provide a forum for the UK HE sector on energy matters. The network is based on the principle of learning and building on what other energy managers have already achieved. This avoids duplication and facilitates the flow of useful information on technologies and practices that have been successful and ones that have failed. More detail on the Sharefair network is at Appendix F, including a list of materials available on topics it has addressed.

Energy Consortium web-site

A number of HE institutions are members of the Energy Consortium (formerly known as the Consortium for Higher Education Energy Purchasing, CHEEP). Member institutions have benefited tremendously from the advice provided on this web-site in negotiating energy contracts that offer value for money. The web-site also contains links to other energy-related sites.

Awareness – institution-wide communication

Communication is important: in many institutions, responsibility for energy management lies solely with technical or estates staff. This makes it difficult to ensure that the institution's values, aims and objectives regarding the environment and energy issues are communicated on an institution-wide basis. One way that some institutions have managed to get the message across to staff has been to illustrate the savings that they can make in their own homes. It is suggested that institutions use checklist 3 listed in Appendix D2, to identify ways to address communication issues more effectively.

Funding councils

A number of energy management practitioners feel that the statutory framework needs to be supported by a requirement of the HE funding bodies to request information covering energy and other issues, to provide effective accountability and assurance, and to facilitate further changes in energy management within HEIs.

Next steps

Data collection and benchmarking will become increasingly critical issues for HEIs to consider, especially as current methods make comparisons impossible even within HEIs. The Higher Education Environmental Performance Improvement (HEEPI) project is expected to provide benchmarks that can be adopted across the sector (for further details regarding this project, funded as part of the Good Management Practice Initiative, go to www.hefce.ac.uk/GoodPrac/fdgmp/2001/GMP232.htm and www.heepi.org.uk/). If sector-wide agreement about voluntary targets, either in terms of consumption or emissions is not forthcoming, it seems inevitable that targets will be imposed externally. To avoid the negative effects of such a scenario, HEIs are recommended to adopt a risk management approach. A good practice checklist is provided under checklist 2 in Appendix D2.

Inevitably, there have been significant changes since the 1996 study. This report advocates, therefore, that institutions – for their own benefit – identify the actions necessary to address the above concerns.

Structure of the report

Section 1 is an overview of the management arrangements for utilities in the HE sector. Section 2 considers issues that impact on sustainability for energy and the environment. Section 3 identifies the issues that will have an increasing impact on the way that institutions operate in the future. Appendices A to I contain further resources as well as background information.

1. Utilities management in the HE sector

Introduction

This section provides an overview of the management arrangements for utilities in the HE sector, based on the contributions of an expert working group, the results of a questionnaire on communication, and examples of good practice provided by higher education institutions and other organisations. The overall findings were informed by the separate outcomes of the sector profiles for 1999-2000 and 2001-02, and the European Commission study 'Barriers to Energy Efficiency in the UK Higher Education Sector (1998-2000), as outlined below.

Sector profile 2001-02

As part of this evaluation of the 1996 energy management value for money (VfM) study, a questionnaire matrix was distributed on communication issues. It covered strategic policy framework, management responsibilities, motivating and marketing, and training arrangements. The replies received indicated that although progress had been made, the effectiveness of such arrangements continues to vary tremendously between institutions. A summary of the results is given below; further details are available in Appendix D1.

Strategic policy framework

For some institutions, while their energy management arrangements recognised energy efficiency issues, they were addressed in an ad hoc fashion and an energy policy had not been formally adopted by the institution. The majority, however, felt that effective energy management arrangements, including water management, were in place and were documented within an approved policy for the management of all utilities. Some consideration had been given to environmental issues, but arrangements differed between institutions – from no formal environmental policy or management system being in place, to the utilities policy being integrated within the institution's broader approach to implementing an environmental strategy. Few institutions felt that their present arrangements enabled a utilities policy to be embedded in an environmental strategy; in addition, neither the environmental strategy nor the utilities policy were periodically reviewed and updated – say, at least every three years – by a senior committee at their institution.

Management responsibilities

For the majority of institutions, the arrangements in place enabled promotion of energy efficiency to be undertaken on an ad hoc basis, albeit only by the estates and departmental technical staff. These arrangements were sometimes a part-time/shared responsibility for someone in the estates and facilities management departments only. Equally, it was estates department staff who allocated time, resources and expertise to preparing energy proposals, but often there was no formal annual programme. Disappointingly, the replies still meant that responsibility for energy/utilities management lay solely in the estates department, and that energy management was not widely shared or promoted within the institution. For those institutions that had appointed energy managers, the main responsibility of these staff was the procuring and monitoring of utilities consumption, and some promotion of energy efficiency. The replies received also indicated that the senior management team within a number of institutions did not take a proactive approach to support fully the role of the energy management team within a sustainability strategy. Similarly, utilities monitoring, management and reporting were not fully integrated into senior management committee cycles, with little positive feedback being given to the energy management team.

Motivating and marketing

The replies received supported the view that this aspect of energy management is often ignored by many institutions. Many indicated that there was some promotion of energy issues, but nothing regular or targeted, and that while there was ad hoc staff awareness training given by estates staff, this was not part of a staff development programme. Some institutions replied that an energy or environmental committee was the main

channel for management reporting, together with direct contact with major energy users in their institutions. Only a small number of institutions replied that there was clear delegation of responsibility for utilities consumption – with targets, monitoring and management reporting/feedback being provided to energy consumers. Similarly, only a few institutions marketed the value of environmental protection, energy efficiency and the performance of utilities management within the institution and outside it.

Training arrangements

The majority of institutions stated that professional and technical journals were scanned on an ad hoc basis for information on the latest developments in energy efficiency, and that trade journals, literature and other sources were studied for energy implications when replacing and purchasing new equipment for the institution. Some institutions indicated that there were limited training opportunities available to estates, departmental technical and energy management staff to develop, and to acquire, further skills in support of their energy management responsibilities. Only a small number of institutions replying felt that their institution provided an active technical library, containing both web-based and printed environmental, domestic and non-domestic energy efficiency materials. Similarly, only a few felt that continuous and comprehensive professional development was arranged for all estates, departmental technical and energy management staff within the institution, to support energy awareness actions.

The above findings demonstrate that further improvements are still to be made by a number of HE institutions, particularly in view of the encouraging findings obtained in 1999-2000, when a survey evaluation was undertaken to identify the progress achieved by the sector since the publication of the national report. The 1999-2000 findings are summarised in Table 1.

Sector profile 1999-2000

Following publication of the 1996 energy management reports (HEFCE M 5/96 and M 16/96), a number of higher education institutions enhanced their energy management arrangements. A questionnaire survey provided the results shown in Table 1, relating to improvements made.

Table 1 Summary of findings of 1999-2000 survey evaluation of energy management by HEIs

Improvements made – changes introduced by institutions since the publication of the energy management reports in 1996	**Institutions' responses – Number of replies (positive changes achieved %)**
Signed up to the Department of the Environment's 'corporate commitment' initiative since March 1996?	18 (12% increase since 1996)
Staff attend BRECSU and ETSU energy workshops and training events?	54 (37%)
Implementation of BREEAM processes?	23 (16%)
Implementation of energy policy since March 1996?	38 (26%)
Policy linked to its estate strategy and environmental policy?	40 (28%)
Policy contains specified objectives and performance measures for the management and conservation of energy?	32 (22%)
Appointed an energy committee since March 1996?	25 (17% increase since 1996)

Improvements made – changes introduced by institutions since the publication of the energy management reports in 1996	Institutions' responses – Number of replies (positive changes achieved %)
Committee responsible for updating, implementing and monitoring the energy and environmental policies?	32 (22%)
Committee identified, developed and implemented arrangements to help institution manage its energy resources and increase environmental awareness among staff?	27 (19%)
Committee responsible for reporting and disseminating energy management information to the management team and to staff/students?	27 (19%)
Appointment of energy manager since March 1996?	35 (24%)
Energy manager responsible for identifying, developing and implementing arrangements to help institution manage its energy resources and increase environmental awareness among staff?	56 (39%)
Energy manager responsibilities include acting as change-manager/liaison officer for good energy practice?	54 (37%)
Estates (and other) staff responsibilities include acting as change-manager/liaison office for good energy practice?	57 (39%)

The national report, published in 1996, indicated potential savings of between 10 and 20 per cent. Such savings would be achieved by HEIs through a mixture of cost savings (linked to good procurement arrangements, beneficial changes in the prices of utilities, and so on), and the adoption of better energy management practices.

Analysis of the energy cost data during the period 1995 to 1999 indicated that electricity prices rose in 1998 to 3.93p/kWh and then 4.97p/kWh against falls in previous years. Prices then continued to fall during 1999. The position regarding gas prices was that prices rose in 1997 to 14.90p/16.45p per therm and in 1998 to 20.40p/21.73p per therm against falls in previous years. Gas prices, like those for electricity, then continued to fall during 1999. The average increases for water and sewerage services rose by 21.7 per cent and 25 per cent respectively during the same period (1995 to 1999).

Since the original survey in 1999-2000, 69 institutions (42 per cent) reported energy savings of approximately £12.5 million (10.5 per cent). It was concluded therefore, that:

- those HEIs reporting savings in excess of 10 per cent (41 per cent of replies) probably did so through a mixture of good procurement and good energy management processes
- those HEIs reporting savings of less than 10 per cent (59 per cent of replies) probably did so mainly or solely through good energy procurement arrangements.

On an HE sector level, these results indicate that there is further scope for savings to be made, ie, as a result of good procurement and energy management arrangements.

In addition to the surveys undertaken by the funding bodies in 1999-2000 and 2001-02, a study was funded by the European Commission during 1998 to 2000 – 'Barriers to Energy Efficiency in the UK Higher Education Sector'. This study also drew on the experience in Ireland and Germany. The findings are summarised below; the web link to the full report is given in Appendix E, *Glossary, bibliography and additional sources*.

Barriers to energy efficiency in higher education – summary findings of a European Commission study

Universities are large organisations with complex decision-making structures and with organisational practices heavily influenced by public sector rules (for example, financial accounting, equipment purchasing). Energy using technologies and efficiency opportunities are largely buildings related (heating, lighting and so on). Most universities have major capital programmes which makes the energy efficiency of new buildings of particular importance. In the UK, Ireland and Germany, five or six case studies were conducted of energy management practices within individual universities. Some of the main results are summarised below.

Energy management practices in higher education

Common features of the organisation of energy management in the case studies in Ireland, Germany and the UK include the following:

***Organisation**: Energy management was very much a technical exercise, centralised in the estates department and legitimated on cost saving grounds. In Ireland and the UK, the bigger institutions had a full-time energy manager. The majority of energy efficiency improvements derived from routine maintenance, new build and refurbishment.*

***Energy and environmental policy**: Institutions with an established energy policy that included quantitative targets were in the minority. Several institutions had environmental policies, but these had little impact on energy efficiency.*

***Energy information systems**: These varied widely in quality between rudimentary to best practice. Use of building energy management systems (BEMS) also varied from basic to extensive. Comprehensive information systems and standardised BEMS are prerequisites for effective energy management.*

***Accountability and incentives**: Few institutions charged departments for energy use, with utilities costs either being included within general overheads or charged on the basis of space occupied. There were major internal obstacles to the introduction of 'devolved budgeting'.*

***Capital budgeting and investment criteria**: Over half the institutions had a dedicated budget for energy efficiency investment, although this was a secondary source of energy efficiency improvement. Investment criteria usually fell in the range of two- to five-year paybacks, with no use of an internal rate of return (IRR).*

***New build and refurbishment**: All institutions had major ongoing capital programmes, and all reported a wide range of barriers within the construction process which acted to substantially undermine the energy efficiency of new and refurbished buildings. These derived from the strict adherence to capital budgets and the organisation of the construction industry, including the incentives placed upon the different organizations involved (ie, sector organisations).*

***Purchasing and policy integration**: None of the institutions had been successful in integrating energy*

concerns into purchasing policy, and all gave examples of where energy efficiency opportunities had been lost. The use of whole life costing was limited.

***Awareness and culture**: The level of energy awareness among staff and students was uniformly reported to be poor. The importance of a high level 'policy champion' in achieving results was clearly demonstrated.*

***Energy management and outsourcing**: There was considerable scepticism about the value of energy service contracts, with particular concerns about union opposition.*

Key policy initiatives for higher education

Much can be achieved at the organisational level through adoption of best practice energy management procedures, including improved controls and efficiency standards for new buildings. These may be encouraged by the funding bodies for the sector through measures such as mandatory reporting of energy performance, inclusion of energy management in audit criteria and capital funding for cost-effective energy efficiency projects. Also important is the requirement for whole life costing within public procurement rules. Parallel initiatives are required within the construction industry, including the encouragement of integrated design and a move away from cost based competitive tendering. Broader initiatives at the national level which may assist the sector include revenue neutral energy taxation, tighter regulations on the energy performance of new buildings, and market transformation programs for common items of equipment such as personal computers.

Common problems identified by the sector profile study surveys included lack of investment and allocation of resources in energy saving measures, and an absence of a strategic policy framework containing specific performance measures, aims and objectives for the management of energy and other utilities.

The 1996 study also identified barriers to energy efficiency in HEIs. These are considered as specific issues relating to energy management and are outlined below.

Specific issues for energy management

Changes in the HE sector

In addition to the data collection and energy market-led changes detailed in this section, other factors have had to be accommodated in managing energy consumption and cost. For example:

- increase in student numbers
- impact of IT in building design and the increased sophistication of equipment used
- energy-intensive equipment, for example fume cupboards
- intensity of building use – 24-hours operation
- diversification of academic activities
- increased complexity of research activity.

Energy market

Since 1996, the energy market has been restructured and the New Energy Trading Arrangements (NETA) have been introduced. One benefit has been that smaller sites (under 100kW) can now contract their energy requirements more competitively.

Under NETA all utilities are tradable commodities, which may be foreign-owned but are subject to UK law. Costs associated with utilities are often volatile, which makes it difficult for institutions to predict and manage utilities budgets accordingly. Online trading for energy contracts has also meant that institutions now have to respond more quickly in accepting new contractual arrangements, often in a matter of few hours.

Across the sector, in excess of £200 million each year is spent on utilities, including water (source: EMS Annual Report 2002). Water supply is still subject to regulation, and for many institutions water costs are greater than other utility costs. Since water costs are now significant for institutions they should be given the same consideration as other utilities. Future energy consumption statistics will probably require reporting of carbon consumption as well. This will require HEIs to consider the sources of the energy they procure, such as green electricity, as well as the means of delivering heat, coolness and power to their estates.

Changes in data collection

A further change following deregulation of the energy market has been the faster availability of fiscal meter data. These data are now accessible on-line from the energy supplier on a half-hourly basis, which enables institutions to monitor and target campus buildings more easily than in the past. However, some institutions have found it difficult to manage the resulting information overload or to take action on the findings. Additionally – in spite of this information, and accepting that some institutions provide extracts on their energy web-site - only few institutions provide meaningful information to senior management, or in support of bids for funding.

Development of management information and reporting performance statistics

The 1996 report provided guidance benchmarks that were derived from data collected over three months from approximately 20 institutions. These data indicated utilities consumption for a number of building types and building uses. Since that time, several initiatives have examined benchmarking of utilities consumption. The Estates Management Statistics project (EMS) began by considering utilities cost and other data across the whole higher education sector. Data on utilities consumption for 1998-99 to 2000-01 are shown in Table 2. These indicate an overall reduction in consumption by the HE sector. Comparable data do not exist for 1994-95 (the year on which the 1996 study was based). It is therefore impossible to extrapolate backwards. However, information obtained from institutions that have been monitoring energy cost and consumption since 1995, also indicates a reduction in energy consumption. This trend is encouraging at a time when student numbers are increasing and there is increased usage of campus buildings.

Table 2 Utilities consumption data in UK HEIs, 1998-99 to 2000-01

KWh per sq.m. (GIA)/reporting year	Lower quartile	Median	Upper quartile
1998-99	254	299	378
1999-2000	239	289	336
2000-01	243	277	333

Table 2 indicates reductions in energy consumption between 1998-99 and 2000-01 of 4.33 per cent (lower quartile), rising to 11.90 per cent (upper quartile). The median decrease was 7.36 per cent.

The HEFCE good management practice project GMP 232 – 'Environmental performance improvement and benchmarking in HEIs' (the HEEPI project) – is looking at the EMS data and developing detailed performance indicators at an individual building level. These performance indicators are likely to include ones for correction of consumption data by degree-days, to compensate for building locations within the

country, and for hours of occupation of buildings. The project is looking at building use and the effect of level of research activity on building utilities consumption. The project will also provide opportunities for analysis of data in terms of building age, building location and method of construction. It is due to report in August 2003.

The outcomes of the HEEPI project should contribute greatly to this evaluation of the original VfM study, if it provides a more defined range of benchmarks that will be more usable by institutions in the HE sector.

Monitoring and targeting (M&T) systems

These are integrated component parts of Building Management Systems and Energy Management Systems. Institutions will need to have arrangements to obtain and manipulate data from a number of sources. For example, own data operation of specific buildings, utility supplier on-line consumption data, HE sector and market-based comparatives. To inform decision making, institutions should ensure that they have an M&T system in place.

Technology design

Building controls have become more sophisticated; it is now possible to operate building management systems on-line via institutions' IT networks. As part of space management, timetabling for teaching and research facilities is now possible. In any new building project, or major refurbishment project, it is important that energy management input is provided at the design stage. There are numerous examples of where energy management measures have been excluded on the grounds of cost. This has sometimes resulted in expensive retrospective fitting of equipment. The lack of consultation and the non-awareness of design standards and protocols for energy-related equipment, costs time and money.

Investment in energy management

Some energy managers have found it difficult to gain the support of senior colleagues to invest in energy initiatives or re-invest any savings achieved into further energy conservation measures. For example, this may be because the implementation of energy saving measures is part of a larger capital project, and it is difficult to identify the energy cost and savings elements within such new-build or refurbishment projects. The multi-occupancy of academic buildings and the absence of sub-metering data for such buildings have also contributed to a lack of management information and the lack of investment regarding operation of these facilities.

To support further investment in energy conservation, the expert working group (see Appendix B) has developed advice and examples of preparing a business case for energy management measures (see '*Energy management – developing a business case'* on page 16 and Appendix D2, checklist 4). Institutions may also find helpful *'Appraising investment decisions'* and '*Repair or replace decisions'* checklists (Appendix D2, checklists 5 and 6).

2. Sustainability framework for the HE sector

Introduction
Since 1996, the agenda for energy management has broadened and the issues facing institutions are more complex. In this section, consideration is given to issues that impact on sustainability for energy and the environment.

Two working groups, the Project Management Committee (PMC) and the Expert Working Group (EWG) – a group of energy and management representatives from the sector – felt that issues linked to sustainability had become increasingly important since the publication of the 1996 report. As part of this study, the EWG developed guidance checklists and schedules for use by HE institutions (see Appendix D2, *Checklists and other resources*), so that HEIs can assess their present arrangements and identify further improvements in the areas linked to strategic policy development and investment appraisal. The issues raised are discussed in this section.

Sustainability framework
There is a growing realisation and acceptance that all sectors in society need to be more responsible and concerned about their impact on the environment. This is reflected in the increasing amount of UK and European legislation/directives, and in the policies of national and local Government. These actions embrace social, ethical and economic issues along with environmental issues under the umbrella concepts of sustainability and sustainable development.

As part of the above, a number of 'energy targets' have been identified in various sectors (listed under Table 6 – *'Energy targets for the private and public sectors'* on page 26). These have been:

- agreed during negotiated agreements for Climate Change Levy rebates
- set by Government, or
- adopted voluntarily by the sectors concerned (for example, hotels and hospitality).

The Department of Transport and the Regions' (DETR's) document 'Climate Change, the UK Programmes', indicates that carbon emissions will be reduced by 10 per cent (from 2000 levels of 1 MtC by 0.1 MtC in 2010). The White Paper 'Our energy future – creating a low carbon economy' (February 2003) contains government proposals for developing cleaner, greener energy. It details a strategy to reduce harmful carbon emissions over the next 50 years, with major expansion of renewable energy and energy efficiency. The document sets out four goals for the Government's energy policy:

- to work towards cutting emissions of carbon dioxide by 60 per cent by 2050
- to maintain the reliability of energy supplies
- to promote competitive energy markets in the UK and beyond
- to ensure that every home is adequately and affordably heated.

The range of practical measures includes:

- an ambition to double the share of electricity from renewable sources by 2020, from the existing 2010 target of 10 per cent
- £60 million in new money for renewable projects, bringing spending on renewable energy up to £348 million in total over four years

- reforming planning rules to unblock the hurdles to renewable energy
- a new carbon trading system to come into effect from around 2005, that will give energy suppliers and consumers incentives to switch to cleaner energy
- speeding up changes to building regulations and setting tougher standards for energy efficiency in new homes, refurbishments and electrical products.

The umbrella concepts of sustainability and sustainable development are already affecting many aspects of life which are far from political. For example, planning legislation; university curricula in virtually all faculties; and design, manufacturing and management guidance in many sectors.

The HE sector needs to consider establishing now a general energy and environment strategy that encompasses not only operational issues, but also procurement and the disposal of buildings and materials. Failure to do so may have serious impact on their operations.

The members of the EWG considered it important that energy management should include all utilities; this included water-related services. It was felt by the group that environmental issues, such as transport and waste recovery, were a separate issue. The expert working group established that energy and the environment should be treated as separate but complementary issues by an HEI's senior management team. By keeping management responsibilities for each separate, the management agenda for energy and the environment would be more manageable, and separate resources for each could be identified more easily. Together, they would form part of a sustainability strategy. This study focuses on the energy management issues.

The following matters are considered to be important elements in underpinning the sustainability framework:

- development of an estates strategy
- implementation of energy and environment policies
- compliance with energy related legislation and taxation, for example, the climate change levy.

Estates strategy
Samples of institutions' estates strategies have not been examined by the expert working group as part of this update. However, as part of best management practice, the institution's estates strategy should include links to energy management and building maintenance arrangements.

Energy policy
As might be expected, the adoption of an energy policy by HEIs has increased since 1996, following the last review of energy management in universities and publication of the HEFCE report M 5/96, 'Energy Management Study in the Higher Education Sector: National Report'. Energy policies exist, but are limited in their effectiveness as useful documents. Adoption of energy policies does not of itself signal best management practice. The Expert Working Group (EWG) reviewed a representative sample of policies that demonstrated the implementation of good practice. The web page links for these energy policies are given below under *3 Further examples of energy policies*.

In the sample of energy policies reviewed, all institutions established two important strategic elements:

a. A comprehensive energy policy covering the management of all utilities, that forms an integral part of and is updated in line with institutions' corporate plans. These are typically reviewed every three to five years.

b. An energy plan covering the implementation and monitoring of clearly defined annual objectives and performance measures.

Both the policies and plans clearly define responsibilities and ensure effective performance evaluation.

To maximise the tangible and intangible benefits for all HEIs, the EWG recommends that institutions reassess the effectiveness of their present arrangements in the light of the comments above. Institutions may find the guidance given below under '*1 The energy policy'* and *'2 Energy plan'* helpful in conducting this review.

1. The energy policy

This document should set out those 'enduring elements' identified by an institution and underpinning its corporate commitment to managing all utilities, in accordance with an assessment of risk, legislation and best practice guidance. Ideally, the policy will be forward-looking, taking account of planned and possible future regulatory frameworks.

The policy should include:

- defined key strategic aims and values: the statements made should link clearly with the institution's corporate plan
- assessment of risk: this is an increasingly important dimension of energy policies, and institutions should ensure that arrangements are in place regarding risks to energy supplies; use of alternative energy sources; impact of UK government energy taxation policies; EC guidelines and directives
- involvement and responsibility: this should be at both corporate and personal levels, defining awareness, the commitment and responsibilities of the corporate body and individual members of the HEI.

  The EWG accepts that HEIs vary considerably and no single management structure fits all cases. However, each HEI should establish a management responsibility structure, which might include:

  - the responsibilities of the senior management team and major committees
  - appointing or defining an energy management team that could include professional staff (energy engineers, and so on), professional advisers, liaison representatives (including user departments and recognised trades unions) and collaborative arrangements with other public sector organisations
  - defining the personal responsibilities of staff and students.

- implementation of legislation and best practice guidance: this should include a statement of the institution's approach to dealing with current and future legislation and define the key reference points for adoption and implementation of best practice. Institutions are recommended to identify sources of best practice, arrangements for keeping staff up to date and training, and external funding implementation. Sources of information might include the Association of University Directors of Estates (AUDE) and the Association of University Engineers (AUE).

Good practice example
One HEI set itself the task of implementing all relevant Best Practice Programme guidance (Department of the Environment) within two years of publication.

2. Energy plan

This short-term operational plan should cover arrangements for the following:

- performance monitoring and reporting, target setting and communication – HEIs should define a monitoring and target programme, which sets out all energy related project initiatives together with monitoring criteria. In addition, arrangements should be defined for performance management, including data capture, specific targets and management reporting
- energy awareness campaigns and training, which should define the training needs of the energy management team and of those with overall responsibility for energy management in the senior management team
- energy purchasing arrangements, including available sources of energy, possible improvements in supply, ongoing risk assessment of maintaining continuity and cost of supplies, and the impact of emerging energy technologies
- operational: which should include energy-related matters and projects in maintenance programmes, as far as practicable adopting an energy-efficient design specification, monitoring and compliance with legislation
- investment arrangements: institutions are recommended to adopt investment appraisal arrangements and to consider adopting whole life costing methodology. Possible arrangements for developing business cases for investment in energy programmes are defined on page 16 under '*Energy Management – developing a business case'* and in Appendix D2, checklists 4 to 6.

Case study – University of Edinburgh

The University of Edinburgh has developed complementary sets of policies and plans relating to key areas of performance, such as energy, waste reduction, health and safety, and travel. Each of these policy headings sits within a coherent management framework provided by an overall sustainability policy, adopted by the university's Court in June 2000.

Within its policy, the university identifies sustainable development as 'development meeting present needs without compromising the ability of future generations to meet their own needs'. Sustainability is a process of ensuring the wise use of all resources within a framework in which environmental, social and economic factors are integrated. It is committed to placing sustainability at the heart of its mission by:

- making sustainability integral to the delivery of research, teaching and operational objectives
- taking positive actions promoting continual environmental improvement
- setting and achieving clearly defined sustainable development objectives and targets.

Specifically, the university has undertaken to:

- make sustainability a corporate priority
- develop and deliver appropriate teaching and research
- take a leadership role in sustainability
- contribute to stable community building
- maintain and develop the university in a sustainable manner
- monitor and report on progress towards sustainability.

3. Further examples of energy policies

The Expert Working Group (EWG) recognises that the above suggestions are for guidance only. Institutions may find it useful to refer to other examples of energy policies; some are listed below.

City University: www.city.ac.uk/estateservices/energy.htm

Durham's environmental policy: www.dur.ac.uk/%7Edcm0www/policy.htm

Edinburgh's policy statement:
www.estates.ed.ac.uk/PROCEDURES/WORKS/Guidelines/Sustainability%20Guidelines.htm

Essex has an energy policy www2.essex.ac.uk/energy/Energy%20Policy.shtm and an environmental policy: www2.essex.ac.uk/energy/environment.shtm

Glasgow has a policy on energy management: www.gla.ac.uk/events/energy/

Leeds Metropolitan: www.lmu.ac.uk/fin/envmnt/op/engwat/policy.htm

Loughborough: www.lboro.ac.uk/admin/hse/epappen6.html

Nottingham Trent: www.ntu.ac.uk/green/policies.htm

Sheffield: www.shef.ac.uk/estates/energy/energy_policy.htm and
www.shef.ac.uk/estates/energy/energy_enman.htm

Sheffield Hallam: www.shu.ac.uk/services/facilities/sustainability/index.htm

Sunderland: http://cei.sunderland.ac.uk/USER/energypol.htm

Ulster: http://intranet.ulst.ac.uk/phyres/estates/energypolicy.html

Other schemes of interest:

Birmingham: www.estates.bham.ac.uk/utility/

York is currently developing an energy policy: http://www1.york.ac.uk/inst/sei/energy/matters.htm

Energy management – developing a business case

Members of the EWG felt that energy conservation measures should be subject to the same financial rigours as other calls for funding by institutions. This section addresses the concept of developing a business case, and its importance in the decision-making process within institutions. Further, it provides guidance to energy staff and others responsible for preparing cases and sourcing funding. It is not prescriptive – every institution will have particular processes and styles that their staff will have to follow. Rather, it indicates the sorts of issues that should be explored within a business case. Examples from institutions are provided in the first two case studies at Appendix I.

Why have a business case?

Institution decision-makers face increasingly tough decisions on how to allocate scarce resources, both human and financial. The investment proposal must therefore demonstrate that it offers value-for-money to the institution – this applies equally to requests for additional staffing as it does to requests for capital

equipment. Adopting a business case approach should ensure that those responsible for allocating resources have all the information necessary when making their decision on investment projects. Business cases can vary in format, but all will include financial projections and an impact/benefit analysis – both of which are key in assessing value-for-money overall.

Preparing a business case

The following are the key elements that would normally be included in a business case:

a. *Executive summary* This should summarise the key points of the proposal and include explicitly the resources that are being requested and the benefits that will accrue.

b. *Description of the project/investment* This would be a short but precise description of the project. It should summarise for management why the proposal is being made (draw particular attention to any compliance/health and safety issues, if relevant, and to links with the strategic priorities and institutional drivers), the nature of the investment/project (what is being purchased/requested), what it will do and the benefits it will bring, and where it will impact within the institution. This last point is important in allowing senior management to judge the spread of benefits.

c. *Current position* This section should give any relevant background knowledge that readers will require, plus a brief description of what happens currently. It is important that senior management are able to judge whether what is proposed is a replacement, part-replacement or new investment altogether. If it is a proposal for a replacement and it is essential, then make this clear – for example, by indicating the state of the existing equipment in the case of a capital replacement proposal. See Appendix D2 checklist 6 – *Repair or replace decisions checklist.*

d. *Options appraisal* This section should detail the alternative options that have been considered, including that of doing nothing. The primary purpose of the options appraisal is to select a solution which optimises value for money within the overall constraints of affordability and achievability. Here it is important to highlight the additional benefits that each option might bring – it is suggested that these need to be considered across the whole lifetime of the project. Any assumptions about the external operating environment should be included here. See Appendix D2 checklist 5 – *Appraising investment decisions checklist.*

   For each option, there should be a list of assumptions made, benefits analysis, financial analysis, sensitivity analysis and risk analysis. From these, it should then be possible to do an economic analysis, ie, compare costs with anticipated benefits and so derive value-for-money comparisons.

   The financial analysis needs to take account of the total outlays for the project. These may include, for example, one-off capital outlays, revenue costs and professional fees for advisers. On the positive side, the proposer needs to identify the financial benefits that will flow. These may come in different forms; for example, as savings that will accrue from making the investment (such as CHP, combined heat and power), ongoing current actual revenue savings, sale of existing assets. It is also important to include the residual value of new assets at the end of the investment appraisal period. As expenditure and savings may occur throughout the period of the investment proposal, adjustment will have to be made for the relative cost of money into the future – this is done by discounting net future cash flows back to the present day. Finance staff in institutions will be able to advise should energy managers require assistance.

The sensitivity analysis is critical and may relate to all aspects of the proposal, for example costs, returns, capital machinery performance and savings. Essentially, the sensitivity analysis gets the proposer thinking about the range in which costs and returns might lie. For example, anticipated energy savings may vary by plus or minus 10 per cent, which could have a bearing on the attractiveness of an investment option for senior management. For both benefits and risks, it is important to consider both quantifiable and non-quantifiable aspects – for the non-quantifiable aspects, some scoring mechanism is needed to assess relativity between the options, for example, high, medium, low.

Finally, taking into account the conclusions of the options appraisal, a preferred option is proposed.

In evaluating the benefits associated with energy management projects, it is suggested that whole life costing (or Life Cycle Costing Analysis) is the most appropriate and effective tool to use. A description and consideration of the use of life cycle cost analysis as a possible method of project evaluation can be found in Appendix E, *Additional sources – international,* under *'Life Cycle Costing Manual'.*

e. *Monitoring and evaluation* Once a preferred option has been identified, it is usual to indicate how the overall project will be monitored and evaluated. Within this, the proposer may wish to consider including ways in which expenditure and savings will be monitored, and how the overall effectiveness of the project will be measured. While the monitoring of expenditure in the period of getting the project up and running may be fairly easy to identify, less easy may be monitoring ongoing net savings that may accrue from the investment. This is because other factors that may impinge on savings will have to be taken into account, such as efficiency ratings of ageing plant and equipment, and some measure needs to be determined accordingly.

Helpful information

A *'Business case template'* is available – see Appendix D2, checklist 4.

Sources of external funding – government support for energy efficiency

A number of government initiatives support and encourage energy efficiency within higher education, and on a wider basis. The funding ranges from information and awareness programmes to free or subsidised surveys and grants schemes. The main initiatives that are available at the time of writing are summarised below under Table 3 – *Government initiatives that encourage energy efficiency within higher education*.

Table 3 Government initiatives that encourage energy efficiency within higher education

Scheme	Organisation	Details	Web-site
Action Energy	Carbon Trust	Free publications, training events (including HE network events such as Sharefair), promotional material, software.	www.actionenergy.org.uk/
Action Energy	Carbon Trust	Site Surveys – up to 5 days available for general energy surveys, with up to a further 5 days for assessments of specific issues.	www.actionenergy.org.uk/
Action Energy	Carbon Trust	Design Advice – one day consultation for new-build and refurbishment projects (minimum floor area of 500m^2), with 30% support available for ongoing advice (if required).	www.actionenergy.org.uk/
Market Transformation Programme	DEFRA	Database of energy consumption (and other information) for a range of products including PCs, laptops, TVs, refrigeration and domestic equipment.	www.defra.gov.uk/environment/consumerprod/mtp/index.htm and www.mtprog.com/ www.defra.gov.uk/environment/consumerprod/ecolabel/index.htm
Community Energy Programme	EST/Carbon Trust (for DEFRA)	Grant scheme for capital investment in community heating schemes and for development projects (eg, feasibility studies).	www.est.org.uk/commenergy/
Clear Skies	DTI	Grant scheme (50% funding) for investment in five specific renewable energy technologies other than photovoltaics.	www.clear-skies.org/
Solar Grants	DTI	Grant scheme (40-65%) for investment in photovoltaics.	www.est.co.uk/solar/

The web-site www.inreb.org/showpage.jsp?page=funding.jsp includes software that identifies available sources of funding for a range of activities, including energy and environmental measures. It is updated on a regular basis. Examples of funding received under the Community Energy Programme are given under Table 4.

Table 4 Community Energy Programme Funding

The Community Energy Programme provides funding, information and support to local authorities, housing associations, universities, hospitals and other public sector organisations for the creation, extension or refurbishment of community heating schemes. Examples of successful 'Pathfinder' applications by HEIs are given below. See also www.energysavingstrust.co.uk/commenergy/pathfinders.doc.

UMIST £533,499

The University of Manchester Institute of Science and Technology has two major campuses: the main campus and the Grosvenor site. UMIST will extend its existing heating network to include the Grosvenor site and install 3.9 Mwe of CHP, back up boilers and absorption chilling capacity providing cooling as well as heating. A range of buildings will benefit from the grant, covering a total floor area of 236,147 m². The scheme will save over 3,250 tonnes of carbon per annum. The university will realise more than £270,000 savings on its annual fuel bill.

University of Edinburgh £1,630,948

The University of Edinburgh proposes to replace an existing steam infrastructure which is near the end of its life and install a 2.7 Mwe CHP scheme. More than 30 university buildings, with a floor area of 122,251 m^2, will benefit from the grant. Over 2,130 tonnes of carbon will be saved per annum. This represents a total annual fuel bill saving of more than £222,000.

University of Dundee £50,000

The University of Dundee is constructing a new 9,600m² science laboratory on campus. This new building will require both heating and cooling. The proposal is to use the heat provided by an existing 3 Mwe CHP (heat which is currently being dumped) and extra heat generated by running the units at higher outputs, to provide both the heating and cooling demands. The scheme will save over 100 tonnes of carbon per year. The University of Dundee will save more than £24,000 on its annual fuel bill.

University of Warwick

The University of Warwick applied for a grant to extend its existing heat network and to upgrade its energy network to include CHP. Warwick's existing heat network services mainly academic buildings, with the halls of residence using individual gas fired boilers. The extension will link the academic buildings and the halls of residence and supply them all via CHP. The scheme will result in an annual carbon saving of 1,817 tonnes, which equates to an overall public sector saving of £247,825 per annum.

University of Edinburgh

With the Community Energy funding, the University of Edinburgh can update its heating network to include a CHP system. This new network will serve the main hall of residence, Pollock Hall, which consists of 10 blocks, providing 2,069 study bedrooms. The annual carbon saving for this scheme will be approximately 354 tonnes per annum, equating to cost savings of approximately £56,650 a year.

Appointment of energy managers

One of the successes of the 1996 study was that a number of institutions appointed a dedicated energy manager. The management review guide (HEFCE publication M 16/96) proposed a scale of appointment that linked the number of dedicated energy staff to the total annual energy spend. However, experience gained from the current study has shown that managers were often diverted to focus on areas other than energy. Areas that would benefit from further attention include improving the quality of management

information, organising energy awareness campaigns, seeking support for the investment of energy projects and re-investment of savings achieved.

To be successful, an energy manager needs a range of skills. It is unlikely that all of these skills will be found in one person. The findings of this study indicate that a greater level of success is likely to be found from management arrangements allied to adopting a team approach. This reflects the current arrangements in many institutions, ie, where an energy manager is supported by technical advice from colleagues in the estates department, finance department and, where appropriate, external contractors. These may range from arrangements that are totally in-house to those that are totally externally contracted. However, within each of them it is important to have co-ordination and communication between the various managers and professional advisors. Members of the Expert Working Group have developed a matrix for institutions to identify the pool of resources required to manage their energy arrangements effectively (see Table 5). The matrix suggests the relative advantages and disadvantages of such arrangements. Institutions need to review their present arrangements; otherwise the gains and opportunities from energy management will not be fully realised.

The range of arrangements indicated in Table 5 are all appropriate for institutions, subject to other factors being equal. Numerical indicators have been used ranging from 1 to 4, with 1 representing a preferred option.

Table 5 Matrix of arrangements for dealing with energy management within HEIs

Features	**Full-time energy manager**	**Split in-house responsibilities**	**Partly outsourced**	**Fully outsourced**
Focus on issues	1	2	4	3
A team of people to address a problem	2	1	2	4
Ownership of outcomes	1	2	3	4
Size of energy team	4	3	2	1
(Suitable for) size of HEI	Large – medium	All	All	All
Range of expertise available	3	2	1	3
Capacity	4	2	2	1
Flexibility/accommodates variability	3	1	2	4
Continuity	1	2	3	4
Credibility	1	1	2	2
User contact	2	1	3	4

The success of the arrangements indicated in Table 4 will be more assured if they are also underpinned by the involvement of a senior management champion within an institution and/or where the senior management team takes energy management seriously.

Training and sharing best practice

Energy managers in the HE sector come from a wide range of backgrounds. Within a number of HEIs, there are a range of energy/environmental related degree courses available. In addition, the Institute of Energy manages a range of training courses up to NVQ level 4.

The following list indicates the range of responsibilities and training provision for energy managers. The intention is to underline the importance of energy managers undertaking continual professional education and development.

Professional background

Educational – degree/NVQ
Professional – engineering/environmental/energy

Training and development provision

Institute of Energy
Professional bodies
ShareFair higher education energy management network
Action Energy (formerly BRECSU) guidance
UK and European legislation

Professional and trade

Journals
Exhibitions
Suppliers

Functional responsibilities

Marketing of energy awareness
Project management and procurement
Investment appraisal and operational documentation
Whole life costing
Obtaining grants and budget management
Design and waste management
Technical
Data management
Business case
Energy modelling
Reporting
Target setting

Institute of Energy – training

Professional development – PD personal plans
CPD – Manual in Energy Management; Training in EM through Open Learning (TEMOL); NVQ4 Managing Energy.

The majority of training undertaken by energy management staff is predominantly in-house. There is also an opportunity for sector organisations, such as HESDA and AUDE, to commission training.

Sector initiatives
A number of sector based initiatives have taken place since 1996. The contribution made by these initiatives is important in terms of knowledge, purchasing energy, performance statistics and good practice.

ShareFair Higher Education Energy Management Network
Since 1996, learning from others has progressed greatly in the form of networking, events, sector groups, meetings and e-mail discussion. The ShareFair Higher Education Energy Management Network was established in 1997. There are 130 members registered, representing 110 organisations out of 140 universities in the UK. Wider participation in these events is encouraged.

The network is based on the principle of learning and building on what other energy managers have already achieved. This avoids duplication, with its associated cost and time lost, while facilitating the flow of useful information on technologies and management practices that have been successful and reasons why others may have failed.

The network employs the following communication routes to achieve this:

- ongoing exchange of information between members, by fax and e-mail
- direct contact between members
- three workshops a year, each adapted to address topics raised by attendees that are of interest to members.

A searchable index of e-mail correspondence is at www.jiscmail.ac.uk/lists/energy-management.html, or select 'Discussions, Energy Management' from the Higher Education Estates web-site (www.heestates.ac.uk). Copies of the notes from workshops are available from networks@bre.co.uk. Extracts of ShareFair events are listed at Appendix F.

Energy Consortium web-site
A number of HE institutions are members of the Energy Consortium (formerly known as the Consortium for Higher Education Energy Purchasing, CHEEP). Member institutions have benefited tremendously from the advice provided on this web-site in negotiating value for money, energy contracts. The web-site contains links to the FHE Action Energy and other energy-related sites, and is at www.energy-consortium.com.

Awareness – institution-wide communication
In a number of institutions, responsibility for energy management lies solely with technical or estates staff. Energy managers, in particular, find this responsibility difficult to discharge on behalf of their institutions. To communicate the institution's values, aims and objectives regarding the environment and energy issues requires greater focus at a senior management level.

Keeping messages up to date and relevant is difficult with yearly changes in student population. Those institutions that have undertaken awareness campaigns with the student body have found it to be effective in the short term. The experience of institutions has often been that first-year students are keen on energy-saving, but in later years this interest wanes. A potential solution to these difficulties is to involve students more actively in the marketing of energy management. Some institutions identified incentives – often financial – for students to save energy while in residential accommodation, by offering rent rebates. Other institutions identified ways in which the student body was actually involved in initiating the awareness campaign, such as asking for new ideas, and poster appeals.

To promote the benefits to staff, one common approach adopted by institutions has been to illustrate the savings that can be made in employees' own homes. The hope is that this ethos would be extended to the workplace. For further examples see Appendix F – *Summary of ShareFair HE Energy Management Network Events* and Appendix I – *Case studies.*

3. Future issues

This section addresses issues that will have an increasing impact on the way that institutions operate in the future.

Legislation
Institutions have to respond to legislation covering workplace regulations (Health and Safety), and the revision of Building Regulations parts L1 and L2, April 2002. Looking ahead, the legislative agenda in the UK will be driven by the following UK legislative initiatives and European directives:

- Building Regulations: parts L1 and L2, April 2002
- EC Directive on the energy performance of buildings, to be implemented by January 2006
- Sustainable Energy Bill 2003
- White Paper *'Our energy future – creating a low carbon economy'* requiring 10 per cent reduction in carbon emissions by 2050.

Through such measures governments can help organisations to make economically efficient decisions which benefit both themselves and society at large. Possible measures in the higher education sector to respond to upcoming requirements could include:

- improved reporting and benchmarking of university energy consumption
- reform of university purchasing procedures
- promotion of energy service contracting
- market transformation programs for technologies, such as motors
- a series of measures within the construction industry, including the use of partnering and integrated design. See Appendix E, *Additional resources – publications and reports: 'Barriers to energy efficiency in the UK higher education sector*'.

Building regulations
The new Building Regulations Thermal Standards – Part L in England and Wales, Part J in Scotland – will include consideration of existing buildings.

Energy performance by building
A directive on energy performance of buildings was published in the EU's Official Journal in January 2003. The development sets the clock ticking for implementation of rules lauded as a key plank in the EU's strategy to combat climate change. See Directive 2002/91/EC of the European Parliament and of the European Council of 16 December 2002 on the energy performance of buildings (Official Journal L 001, 04/01/2003 P. 0065 – 0071), which is on the web at:
http://europa.eu.int/eur-lex/pri/en/oj/dat/2003/l_001/l_00120030104en00650071.pdf

Under the law, EU member states must set up, by 4 January 2006, a scheme to certify the energy performance of all buildings and carry out regular inspections of boilers and air conditioning systems. By the same time, all building construction, sale and rental transactions will have to be accompanied by an energy performance certificate no more than ten years old, allowing potential occupants to compare building energy efficiency. For large public service buildings the certificate will have to be on public view. The certification requirement is expected to be the main driver of greater energy efficiency in buildings, but the directive also requires member states to lay down their own national minimum energy efficiency standards. No EU

minimum standard has been set. Religious buildings, temporary buildings, protected historic buildings and holiday homes are exempt (http://europa.eu.int/comm/energy/index_en.html).
The Expert Working Group recommends institutions to take action sooner rather than later, as to take action later will inevitably be more expensive in management time and implementation costs. Institutions have a choice between voluntary (proactive) measures or enforced compliance with legislation (reactive) actions.

Drivers for sustainability
In formulating environmental policies to address sustainability issues for energy, institutions need to be mindful of two drivers.

a. The need to help building owners and their building maintenance and construction teams reduce the impact associated with both constructing and operating buildings.
b. The need to address energy utilisation, both consumption and cost, in existing buildings.

The two documents below provide a broader consideration of these issues and other factors impacting on estates management for the further and higher education (FHE) sector:

- Drivers for sustainable estates management in the FHE sector (David Somervell, University of Edinburgh)
- External drivers for integrating sustainability into estates management in the higher education sector (Dr Ian Knight, Cardiff University).

Energy targets
The following targets have been identified so far for the private and public sectors.

Table 6 Energy targets for the private and public sectors

Market sector	Energy target	Comments
Industry (negotiated agreements)	Various agreements, most of which have set a reduction target for carbon emissions of approximately **15% between 2000 and 2010**. Interim targets and dates have been set within each agreement.	Umbrella agreements have been made between DEFRA and various trade bodies representing energy intensive business sectors for climate change agreements. The sector undertakes to meet a carbon saving target in return for an 80% discount from the Climate Change Levy.
Government estate	Carbon emissions for 2010 to be 10% less than those for 2000.	
Healthcare	Two sets of mandatory targets exist for NHS bodies in England (from March 2000 to March 2010): ▪ to reduce the level of primary energy consumption by **15% or 0.15 MtC**. ▪ to achieve **35-55 GJ/100 cu.m**. energy efficiency performance for all new capital developments; and that all existing facilities achieve **55-65 GJ/100 cu.m**.	Target set by John Denham, Minister of State for Health, in a letter dated April 2001 to chief executives and estates managers for all NHS trusts in England.

Market sector	Energy target	Comments
Schools	Carbon emissions to be reduced **by 10% of 2000 levels by 2010** (or 20% of 1990 levels by 2010).	This target is referred to in correspondence between the Minister for Environmental Affairs and the Parliamentary Under-Secretary of State for Education.
Universities and colleges (FHE)	At the time of this report, no specific savings targets have been set for HE institutions. DETR's publication, *Climate Change – The UK Programme*, estimates carbon emissions to be 1 MtC per annum for FHE, of which 0.1 MtC could be eliminated by 2010.	The correspondence referred to above *(Schools)* indicates that DfEE (now DfES) will encourage the HE and FE sectors to set measurable indicators, such as reductions in carbon emissions – UK Government White paper '**Our energy future – creating a low carbon economy' –** (February 2003).
Hotels and hospitality	A voluntary scheme exists, known as Hospitable Climates, with a target to reduce carbon emissions by **15% below 1999 levels by the end of 2010**.	Signatories to this scheme receive regular details of government information, advice and grants that are available to support energy efficiency.
Sport and leisure	**No specific savings targets**, but benchmarks are available for comparison.	Energy performance benchmarks have been tailored to match specific sports centre facilities.
Offices	**No specific savings targets**, but benchmarks are available for comparison.	Energy performance benchmarks are currently being developed as for sports centres.
Retail	**No specific savings targets**.	

Government bodies

The work of the following panels is also important:

- market transformation panels
- Sustainable Development Education Panel
- UK government: DTI and sustainable construction
- Sustainable Development Commission.

Together with increasing legislation, the above provide a clear indicator of government intention to correct failures in the market for energy management and to improve organisational decision-making. For further details see Appendix H, *External drivers for integrating sustainability into estates management in the HE sector.*

Sustainable Development Education Panel

In its third annual report (2001), the panel identified that:

'Sustainable development is now recognised as a mainstream issue for the further and higher education (FHE) sectors, and the response called for is not just one of damage limitation. These sectors have a major

role to play in building the capacity of their staff, students and local communities to participate fully and effectively in translating the rhetoric of sustainable development into reality. Their associated standard setting bodies also have an important influence on the curriculum.'

Energy service companies

In the private and commercial sectors, some companies are outsourcing non-core activities to enable them to focus on the main elements of their business. Facilities management, catering and the supply of energy – including the purchase, installation and maintenance of equipment to meet heat, light and power needs – are areas currently being contracted out. By employing an energy services company (ESCO) to manage the supply of energy a company can concentrate on its main activities.

Action Energy has produced free information on the subject of ESCOs. *'The efficient provision of energy through the use of energy service contracts'* (reference GIL67) provides an introduction to energy service contracts and highlights the types of contracts and funding arrangements available. In addition, it details case studies of organisations that have contracted out their energy services. Energy service contracts cover: supply of energy; purchase, design, installation, operation and maintenance of plant; and can include energy audits and energy efficiency advice.

There are many benefits to contracting out the energy services for an organisation. A key benefit is the transfer of the risk from the company to the energy services company. The main risk is financial. If new plant is required, the cost is borne by the energy services company; any loss that occurs as a result of a breakdown in the plant or unforeseen down-time can also be the responsibility of the energy services company.

The level of risk the energy services company takes on depends on the content of the contract. Also, performance measures can be written into the contract, which can improve energy efficiency within the organisation.

Contracts can include as many or as few elements of energy services provision as an institution requires; in addition they can last as many years as required.

Climate change levy

This levy was introduced with effect from April 2001. High energy users are encouraged to reduce costs. Current provisions provide the following exemptions for HE institutions:

a. Domestic energy use.
b. Energy consumption below specified thresholds.
c. Pure research (for non-applied, commercial activities).
d. Implementation of quality CHP schemes.

Future changes to the climate change levy cannot be predicted. However, if current exhortations are not acted on, energy taxation measures are likely to feature more prominently in the future and impact on institutions.

Accountability and assurance

A number of energy management practitioners feel that to facilitate further changes in the management of energy within HEIs, the statutory framework provided by legislation needs to be supported by requirements

of the funding bodies to request information covering energy and other issues. However, it must be recognised that this would add to the accountability burden currently borne by institutions.

The issue of data collection and benchmarking will be increasingly critical in the future. At present, the way data are collected across the sector makes comparison between buildings and institutions almost impossible. It is hoped that the outcome of the current HEEPI exercise, expected in late 2003, will provide guidance and benchmarks that institutions will adopt across the sector. Benchmarking is critical to understanding the absolute and relative performance of buildings, institutions and their management of energy. Without these data and sector-wide agreement about voluntary targets, either in terms of consumption or emissions, it seems inevitable that externally imposed targets will be introduced.

The above issues will impact in various ways, and institutions are encouraged to take action now. A key component of any legislation will be the introduction of benchmarks. Institutions are encouraged to set up a transparent process to show that they are taking action to meet these benchmarks.

Since a failure to respond effectively is likely to lead to further legislation – that may be monitored by agencies such as funding bodies – a risk management approach is suggested and a good practice checklist has been developed (see Appendix D2, checklist 2 – *Energy management risk prompt list*).